

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) A method enabling automated repair of defects in a composite structure formed with a material placement machine that lays composite material in one or more courses and one or more plies to form the structure, the method comprising:

inspecting a course of the composite structure for defects;
determining whether a defect detected by the inspecting is unacceptable;
determining whether a defect detected by the inspecting is repairable by the material placement machine without user intervention; and
automatically causing the material placement machine to return to and place material sufficient for repairing a defect determined to be unacceptable and repairable by the material placement machine without user intervention.

2. (Original) The method of claim 1, further comprising automatically causing the material placement machine to return to each defect determined to be unacceptable.

3. (Original) The method of claim 1, wherein the automatically causing includes electronically accessing positional data defining a location of a defect.

4. (Original) The method of claim 1, wherein the automatically causing includes creating a program to automatically generate instructions for causing the material placement machine to return to and place material sufficient for repairing defects determined to be unacceptable and repairable by the material placement machine without user intervention.

5. (Previously Presented) The method of claim 1, wherein the method includes communicating with an inspection system performing the inspecting.

6. (Original) The method of claim 1, further comprising exterior monitoring of the material application position of the material placement machine to determine a location of a defect detected by the inspecting.

7. (Currently Amended) A method comprising:
using a material placement machine to lay one or more courses and one or more plies of composite material to form a composite structure;
inspecting ~~a composite structure~~ the one or more courses for defects;
determining whether a defect detected by the inspecting is unacceptable;
and
automatically causing the material placement machine to return to a defect determined to be unacceptable.

8. (Original) The method of claim 7, further comprising:
determining whether a defect is repairable by the material placement machine without user intervention; and
automatically causing the material placement machine to return to and place material sufficient for repairing a defect determined to be unacceptable and repairable by the material placement machine without user intervention.

9. (Original) The method of claim 7, wherein the automatically causing includes electronically accessing positional data defining a location of a defect.

10. (Original) The method of claim 7, wherein the automatically causing includes creating a program to automatically generate instructions for causing the material placement machine to return to a defect determined to be unacceptable.

11. (Previously Presented) The method of claim 7, wherein the method includes communicating with an inspection system performing the inspecting.

12. (Original) The method of claim 7, further comprising exterior monitoring of the material application position of the material placement machine to determine a location of a defect detected by the inspecting.

13. (Currently Amended) A method comprising:
using a material placement machine to lay one or more courses and one or more plies of composite material to form a composite structure;
electronically accessing positional data defining a defect location on [[a]]
the composite structure; and
automatically causing the material placement machine to return to the defect location as defined by the positional data.

14. (Original) The method of claim 13, wherein the automatically causing includes automatically causing the material placement machine to place material sufficient for repairing a defect at the defect location.

15. (Original) The method of claim 14, wherein the automatically causing includes automatically causing the material placement machine, after completing a ply of the composite structure, to return to a course of the ply in which a defect is located and place material along the course sufficient for repairing the defect.

16. (Original) The method of claim 14, wherein the automatically causing includes creating a program to automatically generate instructions in connection with the positional data, for causing the material placement machine to return to the defect location as defined by the positional data and place material sufficient for repairing the defect at the defect location.

17. (Original) The method of claim 16, wherein the program extracts the positional data from a first file to a second file and generates the instructions within the second file.

18. (Original) The method of claim 14, further comprising determining whether a defect is repairable by the material placement machine without user intervention, and wherein the automatically causing includes automatically causing the material placement machine to repair a defect determined to be repairable by the material placement machine without user intervention.

19. (Previously Presented) The method of claim 13, further comprising inspecting the composite structure for defects.

20. (Original) The method of claim 13, further comprising exterior monitoring of the material application position of the material placement machine to determine a first distance from a first reference point of the composite structure to a defect.

21. (Currently Amended) The method of claim 20, wherein the monitoring includes detecting and counting transitions between contrasting portions of a code ring coupled for common rotation with [[the]] a compaction roller.

22. (Original) The method of claim 20, further comprising:
summing courses completed to produce a total completed course count;
and
multiplying a predetermined course width by the total completed course count to determine a second distance from a second reference point of the composite structure to the defect.

23. (Original) The method of claim 22, wherein summing courses completed includes tracking receipt of signals from a machine load cell indicating whether pressure is being applied to a compaction roller.

24. (Original) The method of claim 13, further comprising determining whether a defect is unacceptable, and wherein the automatically causing includes automatically

causing the material placement machine to return to a defect determined to be unacceptable.

25. (Currently Amended) ~~A program enabling automated repair of defects with a material placement machine, the program~~ machine-readable medium for use with a processor having a memory, the machine-readable medium comprising:

~~a plurality of inputs to enable the program~~ instructions to cause the processor to access positional data defining a defect location on a composite structure formed by a material placement machine that lays composite material in one or more courses and one or more plies to form the structure; and

~~a module for automatically generating instructions in connection with the inputs, for automatically causing a~~ instructions to cause the processor to generate instructions to cause the material placement machine to return to the defect location as defined by the positional data and place material sufficient for repairing the defect at the defect location.

26. (Currently Amended) ~~The program~~ machine-readable medium of claim 25, further comprising ~~a module for extracting~~ instructions to cause the processor to extract positional data from a first file to ~~[[the]]~~ a second file, the second file including the instructions generated by the ~~program~~ processor.

27. (Currently Amended) ~~The program~~ machine-readable medium of claim 25, wherein the ~~module automatically~~ processor generates instructions for automatically causing the material placement machine, after completing a ply of the composite structure, to return to a course of the ply in which a defect is located and place material along the course sufficient for repairing the defect.

28. (Currently Amended) ~~The program~~ machine-readable medium of claim 25, wherein the ~~module automatically~~ processor generates instructions for automatically causing the material placement machine to repair only defects which are determined to be unacceptable.

29. (Currently Amended) The ~~program~~ machine-readable medium of claim 25, wherein the ~~module automatically~~ processor generates instructions for automatically causing the material placement machine to repair only defects which are determined to be repairable by the material placement machine without user intervention.

30. (Currently Amended) The ~~program~~ machine-readable medium of claim 25, further comprising ~~a module for communicating~~ instructions to cause the processor to communicate with an inspection system capable of inspecting the composite structure for defects.

31. (Currently Amended) The ~~program~~ machine-readable medium of claim 25, further comprising ~~a module for communicating~~ instructions to cause the processor to communicate with an inspection system capable of determining a location of a defect by exterior monitoring of the material application position of the material placement machine.

32. (Currently Amended) A ~~program~~ machine-readable medium for use with a processor having a memory, the machine-readable medium comprising:

~~a plurality of inputs for enabling the program~~ instructions to cause the processor to access positional data defining a defect location on a composite structure formed by a material placement machine that lays composite material in one or more courses and one or more plies to form the composite structure; and

~~a module for automatically generating~~ instructions to cause the processor to generate instructions ~~in connection with the inputs,~~ for automatically causing ~~[[a]]~~ the material placement machine to return to the defect location as defined by the positional data.

33. (Currently Amended) The ~~program~~ machine-readable medium of claim 32, further comprising ~~a module for extracting~~ instructions to cause the processor to extract

positional data from a first file to ~~[[the]]~~ a second file, the second file including the instructions generated by the ~~program~~ processor.

34. (Currently Amended) The ~~program~~ machine-readable medium of claim 32, wherein the ~~module-automatically~~ processor generates instructions for automatically causing the material placement machine to return to only defects which are determined to be unacceptable.

35. (Currently Amended) The ~~program~~ machine-readable medium of claim 32, further comprising ~~a module for communicating~~ instructions to cause the processor to communicate with an inspection system capable of inspecting the composite structure for defects.

36. (Currently Amended) The ~~program~~ machine-readable medium of claim 32, further comprising ~~a module for communicating~~ instructions to cause the processor to communicate with an inspection system capable of determining a location of a defect by exterior monitoring of the material application position of the material placement machine.

37. (New) A method comprising:
electronically accessing positional data defining a defect location on a composite structure;
automatically causing the material placement machine to return to the defect location as defined by the positional data; and
performing exterior monitoring of the material application position of the material placement machine to determine a first distance from a first reference point of the composite structure to a defect, the monitoring including detecting and counting transitions between contrasting portions of a code ring coupled for common rotation with a compaction roller.

38. (New) A method comprising:

electronically accessing positional data defining a defect location on a composite structure;

automatically causing the material placement machine to return to the defect location as defined by the positional data;

performing exterior monitoring of the material application position of the material placement machine to determine a first distance from a first reference point of the composite structure to a defect;

summing courses completed to produce a total completed course count;
and

multiplying a predetermined course width by the total completed course count to determine a second distance from a second reference point of the composite structure to the defect.

39. (New) The method of claim 38, wherein summing courses completed includes tracking receipt of signals from a machine load cell indicating whether pressure is being applied to a compaction roller.